A STABLE BOUNDARY BETWEEN TWO SPECIES OF REPTILE TICKS ON EYRE PENINSULA, SOUTH AUSTRALIA

by T. N. PETNEY†*, C. M. BULL† & R. H. ANDREWS†

Summary

PETNEY, T. N., BULL, C. M. & ANDREWS, R. H. (1982) A stable boundary between two species of reptile ticks on Eyre Peninsula, South Australia. *Trans. R. Soc. S. Aust.* **106**(4), 159-161, 30 November, 1982.

The distribution of the reptile ticks *Aponomma hydrosauri* and *Amblyomma albolimbatum* were mapped where their distributions contact near Cleve on Eyre Peninsula, South Australia. There is an area, 60 × 35 km, where the distribution of *Ap. hydrosauri* is surrounded by *Amb. albolimbatum*. At the edge of this area there is abrupt transition from hosts carrying only one species, to hosts carrying only the other species. The boundary does not coincide with any obvious ecotone.

Distribution records from before 1970 are remarkably similar, indicating the current stability of the boundary.

KEY WORDS: reptile ticks, parapatry, stable boundary, Eyre Peninsula.

Introduction

At parapatric boundaries, the distributions of two allopatric species abut with little or no overlap. It is not always clear what prevents more extensive range overlap (Bull, Sharrad & Petney 1981, Bull & King 1981), but some interaction between the species is often invoked.

The nature of a parapatric interaction can be inferred from temporal changes of the boundary. A boundary where the overlap width increases over time suggests a recent contact of ranges where overlap will become extensive as dispersal progresses. A boundary where position changes with time suggests the competitive displacement of one species by the other. Where neither position nor width of a boundary change with time there must be a stable reversal of the relative fitness of the two species at the boundary.

One of the parapatric boundaries in reptile ticks, which were first reported by Smyth (1973), is between the southwestern species *Amblyomma albolimbatum* and the southeastern species *Aponomma hydrosauri* where their ranges contact on Eyre Peninsula. Smyth used data from 66 reptile hosts caught before 1970 (Sharrad, pers. comm.) in the Cleve-Cowell area. We present data from surveys in the same region in 1979 and 1981 which indicate that the boundary there has remained stable over more than 11 years.

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Materials and Methods

The two tick species, *Amb. albolimbatum* and *Ap. hydrosauri* infest large reptiles, and most commonly the lizard *Trachydosaurus rugosus* (Smyth 1973, Bull et al. 1981). In the area shown in Figure 1, 40 *T. rugosus* were collected in October 1979, and 174 *T. rugosus* and six *Tiliqua occipitalis* in October 1981. All but 19 *T. rugosus* and one *T. occipitalis* were infested with either *Amb. albolimbatum* or *Ap. hydrosauri*. Adult ticks were identified in the field using the characters described by Roberts (1970). Larvae and nymphs were detached for identification in the laboratory.

Results

The distributions in the study area of the tick species *Amb. albolimbatum* and *Ap. hydrosauri* are shown in Figure 1. There is an isolated area of *Ap. hydrosauri* of approximately 60 km × 35 km which is centred around the Cleve highlands and which is almost surrounded by *Amb. albolimbatum*. There is little or no overlap between the two species to the west, northwest and northeast. On road transects across these edges of the distribution of *Ap. hydrosauri* there is a complete change from hosts with only one species, to hosts with only the other species, within 2–7 km. Immediately to the north there have been no host records in this survey or Smyth's survey, but *Amb. albolimbatum* is found alone further north (Smyth 1973).

To the south of the Cleve highlands a narrow tongue (20–25 km wide) of the distribution of *Amb. albolimbatum* isolates *Ap. hydro-*

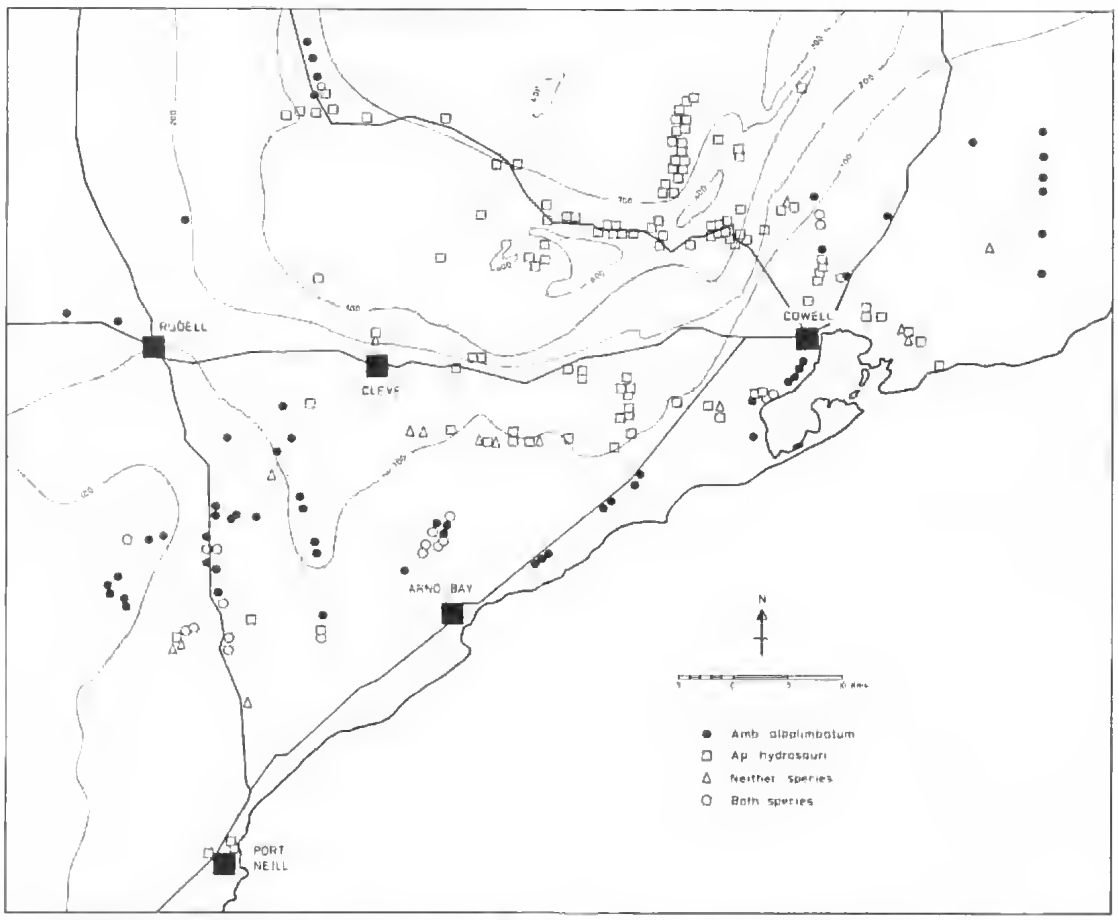

Fig. 1. Distribution of *Aponomma hydrosauri* and *Amblyomma albolimbatum* in the study area. Each host record is indicated by a symbol, but in some cases two hosts found together with the same tick species attached have only one symbol.

sauri populations near Cleve from those in its main distribution, which includes all of the southern part of Eyre Peninsula (Smyth 1973). The interspecific overlap is greatest at the edges of this tongue. For instance on the road from Pt Neill to Rudell, hosts with both species attached were found over 10 km.

Ap. hydrosauri in the Cleve highlands occupies woodland and open scrub characterized by *Eucalyptus socialis* and *E. gracilis*, while *Amb. albolimbatum* in the surrounding lowlands lives in coastal dune vegetation or open scrub characterized by *E. incrassata* and *Melaleuca unciuata* (Specht 1972). However, the sharp boundaries between distributions of the ticks are not associated with distinct vegetational ecotones or consistent altitudinal changes (Figure 1).

Discussion

There is a remarkable consistency between the results of this survey and that of Smyth over 11 years before. In both there was a sharp transition from *Ap. hydrosauri* to *Amb. albolimbatum* between 7.5 and 10 km west of Cleve. In Smyth's survey there was an overlap region 20–24 km north of Cleve, while in this survey it was 23–28 km north. In both surveys there was a tongue of *Amb. albolimbatum* south of Cleve, with some overlap between the species at 10 km north and at 10–15 km west of Arno Bay.

Smyth showed two host records with only *Ap. hydrosauri*, in a coastal site 17 km southwest of Cowell, but in the present survey *Amb. albolimbatum* was found continuously along the coast from Arno Bay to Cowell. This may

represent a range extension of *Amb. alboli-mbatum*, but because Smyth had no other records in this area a precise comparison cannot be made. Otherwise the position and width of the *Amb. albolimbatum* distribution tongue, and the extent of interspecific overlap, is common in the two surveys.

Wherever there is contact between the distributions of any pair of the three species of ticks, *Ap. hydrosauri*, *Amb. albolimbatum* and *Amb. limbatum* they form parapatric boundaries (Smyth 1973, Sharrad & King 1981, Bull & King 1981). At two boundaries (Mt Mary, Bull et al. (1981) and Cleve-Cowell, this paper) we now have evidence that the structure of the boundary has been stable over at least 11 years.

Ap. hydrosauri has at least one generation per year (Bull & Sharrad 1980), and *Amb. albolimbatum* probably is similar[1]. Bull (1978) estimated that these ticks disperse 100–800 m per generation, mainly by movement of their hosts. In 11 years an advancing front of ticks could move nearly 9 km. In the study area there is little evidence for any move at all. Slight differences between surveys in the estimated location and width of a boundary would result from the capture of hosts in different locations, even when the boundary itself does not change. Despite this potential sampling error there is a great similarity between the results of the two surveys.

In each survey there was an abrupt transition between the species at the western and northwestern edges of the Cleve highlands, and a wider overlap to the south of Cleve, but there is no clear environmental change associated with the boundary. In this respect this tick boundary differs from that near Mt Mary where there is a sharp ecotonal change associated with the boundary (Bull et al. 1981). However, the stability of the boundary on Eyre Peninsula suggests that there is some interaction between the species where each is fitter on its own side. We have investigated a number of mechanisms to explain how the tick boundaries are maintained (Bull et al. 1981, Andrews & Petney 1981, Andrews, Petney & Bull 1981), but no convincing explanation is yet available.

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FURTHER EVIDENCE ON THE AGE OF THE TUFF AT MT GAMBIER, SOUTH AUSTRALIA

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Summary

Radiocarbon ages for 11 samples of charcoal collected either below tuff or below ash-affected soils in the vicinity of Mt Gambier are reported. These range in age from modern to 8000 years B.P. The ages are interpreted to infer that significant volcanism occurred 4000-4300 years B.P.